178. Proposed by J. EDWARD SANDERS, Reinersville, Ohio.

Two random planes cut a given sphere. What is the chance that they intersect within the sphere?

No solution has been received.

179. Proposed by HENRY HEATON, Belfield, N. D.

Through every point of the circumference of a given circle, chords are drawn in every possible direction. What is their average length?

Solution by G. B. M. ZERR, A. M., Ph. D., Parsons, W. Va., and LEROY D. WELD, Coe College, Cedar Rapids, Ia.

If the chord varies as the abscissa we get, since $x^2+y^2=2ax$ is the equation to the circle,

$$M=\frac{\int_0^{2a}\sqrt{(2ax)}dx}{\int_0^{2a}dx}=\tfrac{4}{3}a.$$

If the chord varies as the angle it makes with the diameter through its extremity, then, since $r=2a\cos\theta$ is the equation to the circle, we get

$$M=\frac{\int_0^{\frac{1}{2}\pi}2a\cos\theta\,d\theta}{\int_0^{\pi\frac{1}{2}}d\theta}=\frac{4a}{\pi}.$$

MISCELLANEOUS.

161 (Incorrectly numbered 157). Proposed by H. L. ORCHARD, M. A., B. Sc. (Unsolved problem in the Educational Times, London.)

An inelastic rod 9 feet long is placed with its upper end upon a rough vertical plane and its lower end on a smooth horizontal plane, and so that it makes an angle of 45° with each plane. It is now released, and strikes against a smooth sphere of 1 foot diameter placed in contact with the two planes. Determine the subsequent motion.

No solution has been received.

163. Proposed by J. EDWARD SANDERS, Reinersville, Ohio.

Two straight streams of different volumes and velocities come together. Find the path of a body floating in mid-current of either.

No solution has been received.